

REMARKS

Applicants have added new claims that focus on lithiated gamma-manganese dioxide. Applicants discovered that by using a relatively high lithiation temperature they can achieve a high degree of lithiation of gamma-manganese dioxide. Applicants further discovered that the lithiated gamma-manganese dioxide can be dried to remove residual and surface water while still maintaining the gamma-form of the manganese dioxide. This is best illustrated by referring to Figs. 2A and 2B in the application (discussed in Example 2, on page 9). Fig. 2A is the X-ray diffraction pattern of gamma-manganese dioxide that has not been lithiated; Fig. 2B is the X-ray diffraction pattern of the dried, lithiated gamma-manganese dioxide prepared in Example 2. Significantly, the X-ray diffraction pattern of the lithiated manganese dioxide in Example 2 has the X-ray diffraction pattern of gamma-manganese dioxide.

New independent claims 22 and 27 focus on the relatively high lithium content of the lithiated gamma-manganese dioxide. Claim 22 specifies that the lithiated gamma-manganese dioxide includes about 0.22 mole of lithium per mole of manganese dioxide (see page 6, line 24 for support), and claim 28 specifies that the lithiated manganese dioxide includes 0.21 mole of lithium per mole of manganese dioxide (see page 9, line 20 for support). Claims 26 and 31 are directed to primary lithium batteries having cathodes including the lithiated gamma-manganese dioxides recited in claims 22 and 27, respectively.

Applicants will discuss Iltchev et al., U.S. Pat. 6,190,800 ("Iltchev") and Christian et al., U.S. Pat. 6,403,257 ("Christian") and claims 22, 26, 27, and 31 before turning to the other independent claims. The independent claims prior to this amendment were rejected under 35 U.S.C. § 102(b) as anticipated by, or alternatively, under 35 U.S.C. § 103(a) as obvious in view of Iltchev and Christian (independently). Iltchev and Christian each teach lithiated manganese dioxides having at most 0.175 mole of lithium per mole of manganese dioxide. See col. 7, lines 61-62 of Iltchev and col. 6, lines 25-27 of Christian. Neither Iltchev nor Christian suggests that a higher lithium ion content can (or should) be achieved.

Moreover, applicants have provided comparative X-ray diffraction in the application data demonstrating that the lithiated manganese dioxide obtained by Iltchev has an X-ray diffraction pattern significantly different from the X-ray diffraction of gamma-manganese dioxide. Specifically, Fig. 2E provides the X-ray diffraction pattern of Iltchev's dried, lithiated

manganese dioxide (see the discussion on p. 10, lines 3-19 of the application). Iltchev's lithiated manganese dioxide has an extra peak at about 32 theta not found in gamma-manganese dioxide (Fig. 2A. In addition, the peak at about 22 theta in gamma-manganese dioxide has been replaced by the peak at about 24 theta in Iltchev's lithiated manganese dioxide. Without being bound to any theory, applicants believe that the combination of achieving a high degree of lithiation during the lithiation step coupled with careful drying (Example 2 in the application dries at 200°C) avoids a transformation of lithiated gamma-manganese dioxide to an altered form.

Christian uses the same drying conditions as Iltchev and obtains the same lithiated manganese dioxide.

Thus, claims 22, 26, 27, and 31 are novel and unobvious in view of Iltchev and Christian.

Claims 22, 26, 27, and 31 are relatively specific for the lithium content of the gamma-manganese dioxide. Independent claim 32 does not include the lithium content of the gamma-manganese dioxide but instead requires the lithiated gamma-manganese-dioxide to have a high discharge peak (centered at 3.25 volts) when tested using the SPECS low rate discharge test (described on page 10, lines 20-31 of the application). Claim 34 specifies that the lithiated gamma-manganese dioxide has the two peaks discussed on page 11, lines 1-6 and shown in Fig. 3D (discussed on page 10, lines 15-18). Note the peak centered at 3.25 volts. Iltchev's material (referred to as Comparative Example 2) does not have the higher discharge peak at 3.25 volts found in applicants' lithiated gamma-manganese dioxide. As noted earlier, Christian's material is the same as Iltchev's.

Applicants believe that the higher running voltage that they achieved results from a higher degree of lithiation of their gamma-manganese dioxide relative to Iltchev and Christian and the better retention of the gamma-manganese dioxide structure during drying.

Claim 36 is directed to a primary lithium battery having a cathode including the lithiated gamma-manganese dioxide recited in claim 32.

Neither Iltchev or Christian discloses or suggests a dried lithiated gamma-manganese dioxide having the high discharge voltage specified in claims 32 and 36. Thus, claims 32 and 36 are novel and unobvious in view of Iltchev and Christian.

Applicants submit that the claims are in condition for allowance and such action is respectfully requested.

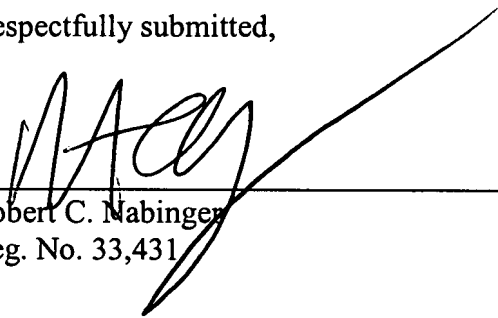
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Enclosed is a \$600.00 check for excess claim fees. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

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Robert C. Nabinger
Reg. No. 33,431

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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